The Dairy.

Milk Standards.

Under Mr. Thos. Macfarlane, chief analyst for the Dominion, the Department of Inland Revenue collected samples of milk from different parts of several Provinces for the purpose of analyzing the same with a view of establishing standards for Canada. Determinations of the specific gravity, the butter-fat and solids other than fat, were made, and the results were published in the Toronto Mail. The samples were taken from ordinary dairy herds, and the analyses showed the average percentage of fat to be 3.86, the lowest average being from Toronto (3.38 percent), and the highest from Halifax (4.24 percent.)

These results elicited communications from Prof. Brown, of the Model Farm, in our leading dailies, showing how that institution had eclipsed these results, the inference being that the Model Farm is making amazing strides in this department of dairying. That the Model Farm has made a large number of analyses of samples of milk from the various breeds maintained at that institution is perfectly true, but it is equally true that this work is utterly barren of practical results. The question of milk standards is one of vast importance to our farmers and dairymen, and yet if the Model Farm authorities had gone deliberately to work to bungle the business, they could not have been more successful. In the first place, no account whatever is taken of the specific gravity—the only standard which at present is of any practical use to our dairymen—and, secondly, a knowledge of the quality of the milk of all the breeds in creation is of no practical value to our farmers until standards for our own herds are first established. It is as important for the farmer to know what breed he should avoid to prevent his herd from deteriorating, as to know what breed he should adopt to build up his herd.

A year or two ago, Prof. Robertson, then the professor of dairying at the Model Farm, did the only work in this direction that has proved to be of any practical value. He demonstrated that ordinary stock, under the same treatment as the Model Farm thoroughbreds received, were at least as profitable as any in the market, and it is to be deeply deplored that his investigations have not been continued. The only practical test which Prof. Brown ever made was with an "Old Grannie" of a cow, and, with one exception, she headed the list. No number of tests made with one breed can prove its superiority over any other breed. Both breeds must be tested, and in the same manner no standards of thoroughbred stock can avail against herds that have never been tested. If the common consent of certain people is evidence in the one case, why not also in the other? And where is the necessity for testing at all? A similar bungle is made at our exhibitions. If the judges in the show ring decide the relative merits of certain cows, then where is the sense in turning the pail or the churn performance into a standard? Who is the highest authority, the judge, the pail, or the churn?

Moreover, it is unjust to include beefing breeds in the standard for dairy purposes. Nobody denies that beef breeds give rich milk, richer even than the average of dairy cows; the former lacks only in the quantity of milk.

Stock-Raising and Grain-Growing in Relation to Soil Fertility and Exhaustion.

No. IV.

There is a superstition amongst the manure theorists that the soil obtains sufficient plant-food from the air to make up for any waste or other deficiency which they cannot explain. True, the soil obtains some ammonia, and other forms of nitrogen, from the air, probably to the average extent of one-third of the crop's requirements, but it is equally true that about a similar quantity is given off, the soil being a self-regulator in this respect, and it cannot be maintained that nitrogen fertility can, on the whole, be increased from this source. To argue the stock-raiser has an advantage over the grain-grower in this respect is to maintain that the aerial ammonia cruelly deserts the grain-grower and rushes gleefully into the fields of the stock-raiser. In no particular can it be asserted that the former has an advantage over the latter in depending upon atmospheric plant food. With reference to the other named constituents of plant food, phosphoric acid and potash, none of which is supplied by the air, the stock-raiser and the grain-grower must both depend upon other sources for their supply. We therefore again arrive at the conclusion that, in order to maintain the fertility of the soil, all the constituents removed by the crop and sold off the farm must be restored in some form or another.

In answering the arguments, or rather the fallacies, of the manure hobbyists, it is only necessary to consider the relative quantities of plant food removed from the soil under the most *intensive* system of farming, for they are a unit in their advocacy of the best stock and the best pastures; but as our object in writing these articles is more to teach our readers to think and calculate for themselves than to answer the theories of our opponents, we shall give the averages as well as the intensive extremes.

The reader should bear in mind that we are guided by average figures both with regard to the composition of the foods, and their products, so that where the variations are slight, nothing will be proved; but where the variations are considerable, the proofs may be regarded as complete.

We shall consider the exhaustion occasioned by the removal of wheat, milk and beef in separate tables. Wheat may be consistently taken as a representative grain crop, the quantity of fertility removed by selling off other grains, under average quantities raised per acre, being near enough the same for all practical purposes. Calculating an average crop at 20 bushels per acre, and a good crop at 40 bushels, and taking the average composition of fall wheat as containing 2.08 percent of nitrogen, 0.79 percent of phosphoric acid, and 0.52 percent of potash, we get the following pounds and value of fertility removed from an acre, calculating nitrogen at 16c. per pound, phosphoric acid at 6c. and potash at 4½c.

TABLE SHOWING THE QUANTITY AND VALUE OF FERTILITY REMOVED FROM AN ACRE OF WHEAT—YIELD, 20 BUSHELS PER ACRE.

	lbs.	c.	Total.
Nitrogen	24.96 ×	16	= $3.99
Phosphoric acid	9.48 ×	6	= .57
Potash	6.21 ×	4½	= .28
Total			$4.84

Calculating the yield at 40 bushels per acre, the number of pounds removed as fertility are simply ascertained by multiplying by 2, the total value therefore being 4.84 × 2 = $9.68.

Let us now compare these sums with the average yearly fertility removed by an average dairyman's cow grazing on an average dairyman's pasture. In this calculation the cow produces 4,000 lbs. of milk per year, and it requires two acres to keep her in grass during the summer months. It will also require two more acres to maintain her during winter, so that 4,000 from four acres are equivalent to 1,000 lbs. of milk per acre annually. In milk the fertility removed is more valuable than in grain, being more available. The average composition of milk, per 1,000 lbs., being 5.4 lbs. of nitrogen, 2 lbs. of phosphoric acid, and 1.7 lbs. of potash, we get the following

TABLE SHOWING THE QUANTITY AND VALUE OF THE FERTILITY REMOVED BY MILK FROM AN ACRE:

	lbs.	c.	Total.
Nitrogen	5.4 ×	17	= $0.92
Phosphoric acid	2.0 ×	7	= 0.14
Potash	1.7 ×	5	= 0.09
Total			$1.15

In considering the quantity of fertility removed from an acre by means of milk, there are two phases of intensity, viz., the quantity of milk may be, say, doubled by a cow of superior merit, and the quantity per acre may again be doubled or quadrupled by pasturing her on good land carrying superior grass. Meanwhile, however, let us merely compare the ordinary cow grazing upon the ordinary pasture (2 acres) with the 20 bushel per acre yield of wheat, and for comparison with the 40 bushel yield, let us suppose that a superior 2-acre pasture, grazing one or two cows, and its equivalent in other crops, for winter feed, will produce 8,000 lbs. of milk annually, so that the quantity and value of fertility removed from an acre will be double those mentioned in the above table—the value therefore being 1.15 × 2 = $2.30.

With reference to the quantity and value of fertility removed by the production of beef, we take the annual growth or increase to be represented by the following analysis, viz., 3.52 percent of nitrogen, 0.42 percent of phosphoric acid, and 0.38 percent. of potash, and taking the daily gain to be 1.75 pounds, we get a total increase of 639 pounds per annum from the four acres, as shown in the calculation with the cows, so that the quantity of annual increase from one acre will be 639 ÷ 4 = 160 lbs., the following

TABLE SHOWING THE QUANTITY AND VALUE OF THE FERTILITY REMOVED FROM AN ACRE DEVOTED TO BEEF GROWING.

	lbs.	c.	Total.
Nitrogen	5.60 ×	17	= $0.95
Phosphoric acid	0.67 ×	7	= .05
Potash	0.60 ×	5	= .03
Total			$1.03

If the animal grazes on two acres, instead of the four, or their equivalent devoted to winter feed, the value of the fertility removed per acre will be double this sum—1.03 × 2 = $2.06.

Until we receive reliable intelligence to the contrary, we shall regard Mr. William Brown, C. E., P. L. S., Model Farm Superintendent, Professor of Agriculture, Live Stock, Dairying, Arboriculture, etc., as the founder and chief promoter of the said School of Practical Theory, and we therefore take the liberty of quoting the